SEAFARM
Seaweeds for a Biobased Society – farming, biorefining and energy production

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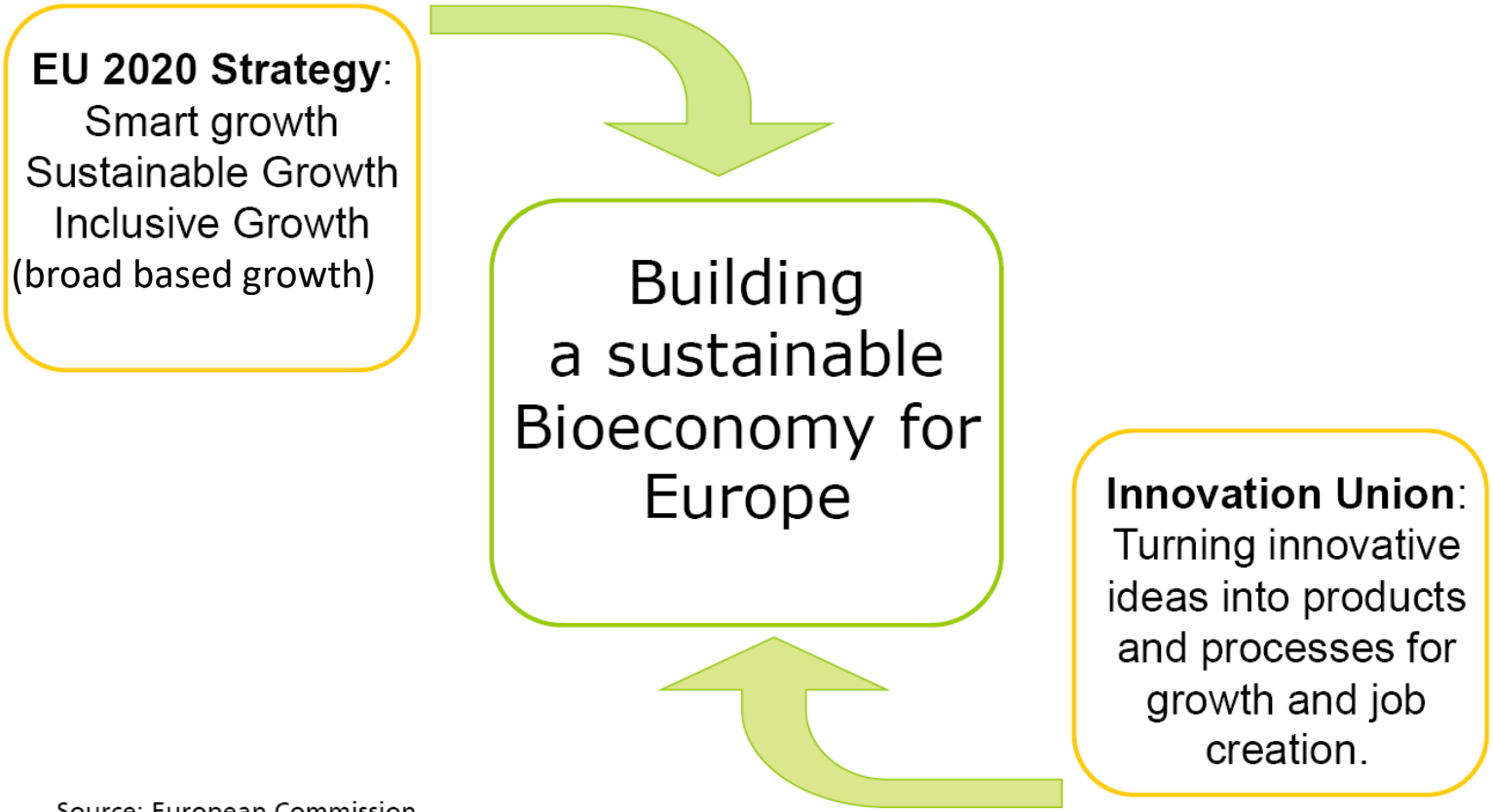
Luleå
Hailuoto
Oulu
Trondheim
Vaasa
Sundsvall
Gulf of Bothnia
FINLAND
NORWAY
SWEDEN
Oslo
Turku
Helsinki
Åland Islands
Gulf of Finland
St. Petersburg
Stavanger
Stockholm
Tallinn
Hiiumaa
ESTONIA
RUSSIA
Skagerrak
Kattegat
Saaremaa
Gulf of Riga
Gotland
Baltic Sea
DENMARK
Riga
LATVIA
Öland
Copenhagen
Malmö
Funen
Zealand
Bornholm
LITHUANIA
Vilnius
Kiel
Rügen
Kaliningrad
(RUSSIA)
Gdansk
Minsk
NORTH
GERMANY
BELARUS
0 50 100 200
Kilometres
POLAND

EU-Overall strategy

Bio-economy – An EU priority



Source: European Commission

TEAM SEAFARM

- Göteborg University, Sven Loven Center, Tjärnö
- Chalmers, Industrial Biotechnology & Food Science
- KTH, Industrial Ecology & Fibre and Polymer Technology
- Linnaeus University, Bioenergy Technology
- Lund University, Department of Economics

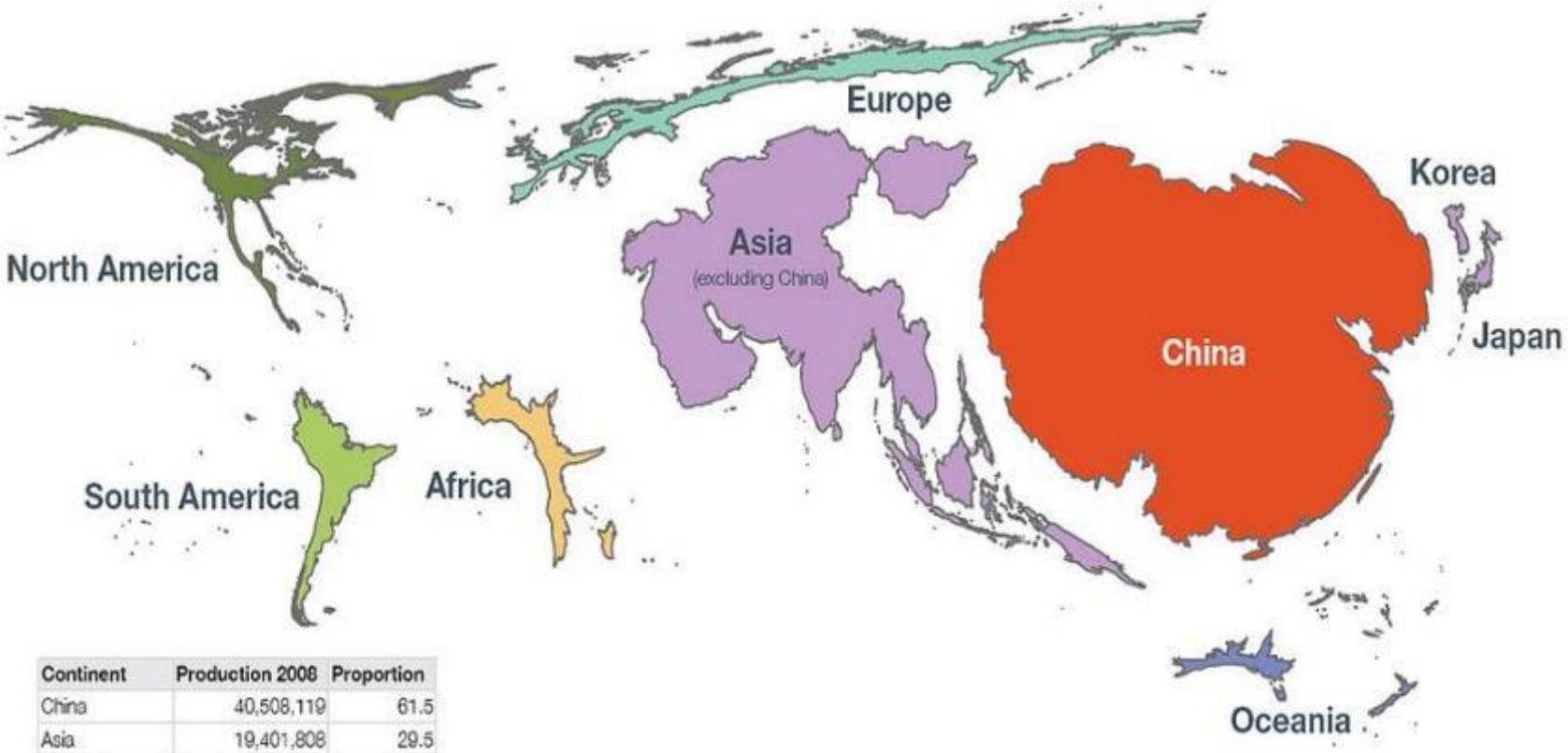
SEAFARM PARTNERS

- Region of Västra Götaland
- Region of Kalmar
- Trelleborg municipality
- Paulig Group
- The Swedish Plastics and Chemicals Federation
- Russell Finex
- Swedish Exergy
- BioMil AB
- Submariner network secretary S.Pro
- KTH and Chalmers Innovation Office

SEAFARM BUDGET

- FORMAS 25 miljon SEK
- PARTNERS 6 miljon SEK
- TOTAL BUDGET 31 miljon SEK or 3.7 miljon Euro

Global dimension of Aquaculture

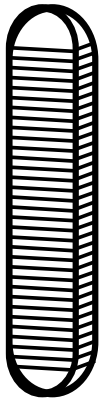


Continent	Production 2008	Proportion
China	40,508,119	61.5
Asia	19,401,808	29.5
Europe	2,341,646	3.6
South America	1,461,061	2.2
North America	965,792	1.5
Africa	952,133	1.4
Oceania	176,181	0.3

Source : WorldFish Center / Conservation International

1. Fertile thallus

2. Spores and seeding on lines wrapped around spools

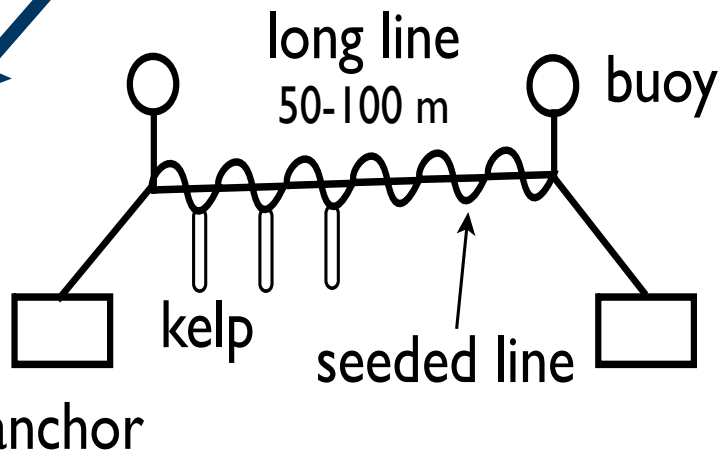


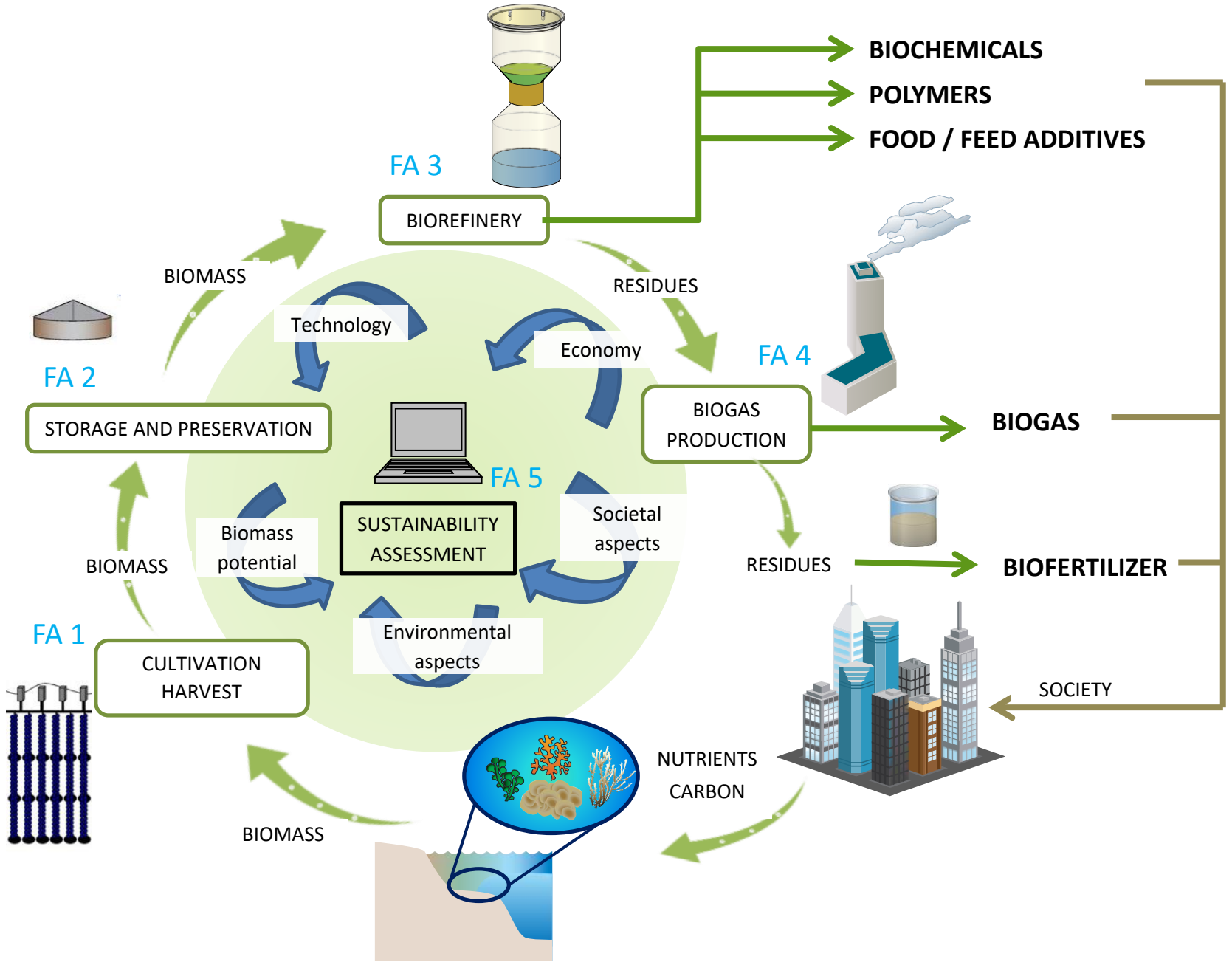
seeded line

3. Indoor culture of juvenile sporophytes on seeded lines

4. Sea-based culture on long lines

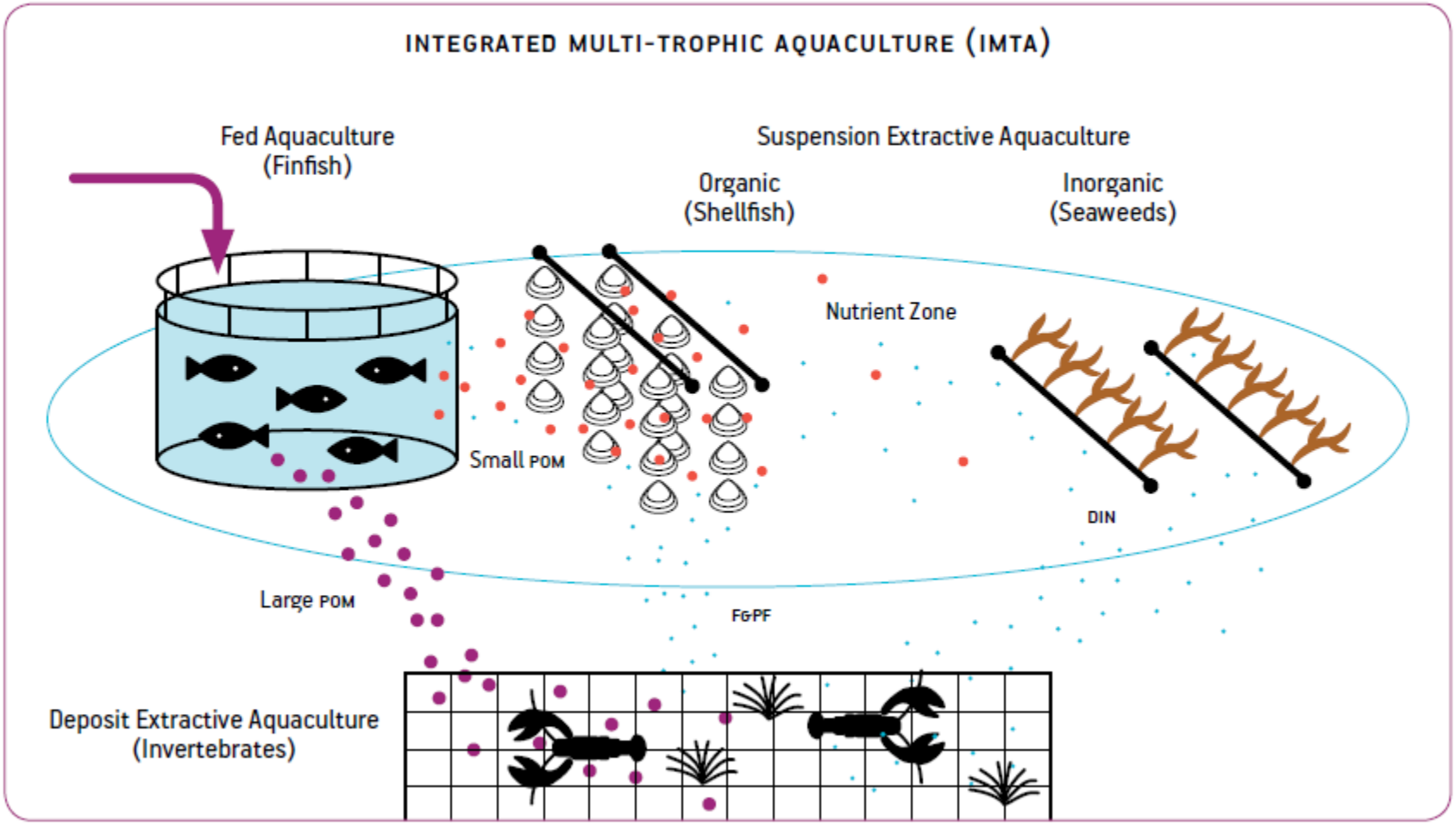
5. Harvest




BIOCHEMICALS
POLYMERS
FOOD / FEED ADDITIVES
FA 3
BIOREFINERY
BIOMASS
RESIDUES
Technology
Economy
FA 2
STORAGE AND PRESERVATION
FA 4
BIOGAS PRODUCTION
BIOGAS
FA 5
SUSTAINABILITY ASSESSMENT
Biomass potential
Societal aspects
Environmental aspects
BIOMASS
RESIDUES
BIOFERTILIZER
FA 1
CULTIVATION HARVEST
SOCIETY
NUTRIENTS
CARBON
BIOMASS

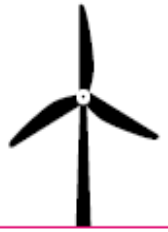
IMTA

Figure 10: Conceptual diagram of an Integrated Multi-Trophic Aquaculture (IMTA) system (based on Chopin, 2011[5]) (POM: particulate organic matter; DIN: dissolved inorganic nutrients; FGPF: faeces & pseudo faeces).



POSSIBLE COMBINATIONS WITH OFFSHORE WIND PARKS

Combinations of Offshore Wind Farms with...



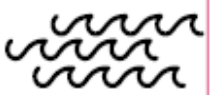
Harvesting of natural foul-ing agents

Macroalgae Cultivation

Mussel Cultivation

Fish Farming

Wave Energy



Microalgae Cultivation

REALITY

VISION


Bacteria


Cyanobacteria


Microalgae


Fungi


Macroalgae

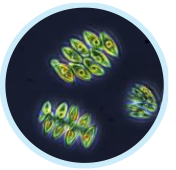

Sponges

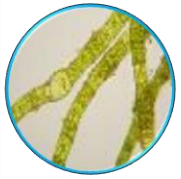

Mussels

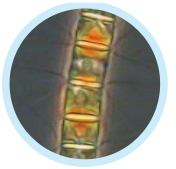
Blue Biotechnology

The global market for marine biotechnology products was around 2.8 billion € in 2010 and will be around around 3.2 billion € in 2015.

- Oceans cover over 70% of the Earth's surface
- Ocean constitutes over 90% of the habitable space on the planet
- estimated 50-80% of all life on earth is found under the ocean surface
- 3.3 billion years of evolution
- All 36 known animal phyla can be found in the ocean (12 can be found on land)
- 0,01% of marine micro-organisms are discovered







Blue Biotechnology
First Achievements

Yondelis®
Anti-Cancer drug
PharmaMar
Tunicate

Collagen wound gel
CRM
Jellyfish
R&D stage

New antibiotics
for treatment
R&D stage

NIVEA® Q10 plus
Face cream
Beiersdorf
Macroalgae

Magnum
Ice cream
Unilever
Fish

Pharma-
ceutic

Medical

Animal health

Cosmetics

Nutraceuticals
Food

High Potential in the BSR

Feed for
aquaculture

Bioremediation

Biofuels

Anti-fouling
systems

Marine
technologies

Concentrate
Feeding stuff
Blue Biotech GmbH
Microalgae

New microbial strains
for degradation of
pollutants
R&D stage

Bio-kerosine
Airbus
Microalgae
R&D stage

Anti-fouling
substance
LimnoMar
R&D stage

New techniques and
methods sufficient for
the exploitation of
marine organisms
R&D stage

Results - Harvesting in Trelleborg

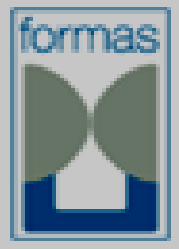
- 2 000-6 000 tonnes dwt
  (10-30 % of standing stock)

- 50-150 tonnes N reduction
  → 5-15 % of annual freshwater runoff

- 170-500 households can be heated annually

SEAFARM INFORMATION

www.seafarm.se



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